useITsmartly

Young People and ICT

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1. Introduction

The energy consumption related to the use of information and communication technology (ICT) is increasing rapidly. Computers, mobile phones, routers, TV sets, game consoles etc. represent about one quarter of the European residential electricity consumption today. In addition, the "hidden" consumption of energy and material resources for production and disposal of ICT and the provision of internet services is increasing further. This makes it important to address the energy consumption of ICT in order to mitigate climate change and environmental problems.

As L. M. Hilty points out, studies on the environmental impacts of ICT face the problem „that both the technology and the way it is shaped and used by society are changing fast" (Hilty 2008). In this way, the efforts to draw an overall picture of the energy implications of the use of ICT can be compared to trying to hunt down a constantly moving target. Reviews of the current knowledge on ICT and energy will therefore always have the character of a snapshot, showing the situation and trends at the specific time of the study. The general trend of increased use of ICT devices and services means that the potential energy savings from the increases in the energy efficiency of the ICT hardware will be more than outweighed by the increase in the total ICT consumption (both measured by number of devices as well as the amount of time and activities that ICTs are being used for). The end result has until now been a steady growth in ICT-related energy consumption – both at the household-level as well as on a systemic level (increasing consumption for data centres etc.).

The use of ICT has become widespread among almost all groups of citizens, but young people in particular have integrated ICT into most of their everyday activities. As the available literature on this topic is limited, we do not attempt to provide a comprehensive cross-disciplinary or cross-cultural overview of what different disciplines have investigated and reported on the interaction between ICT and young people. We will provide a first start at understanding how young people use ICT. Although evidence suggests that one teenager in a household entails a 20 % higher electricity consumption compared to an average adult (Gram-Hanssen 2005), literature on the topic of young people and energy use is to date very limited. And although there is much information on adoption rates for devices etc. per country, little is known about the adoption of ICT by young people and in particular little understanding is available on why young people use certain ICT the way they do. Subsequently, we have made the attempt to identify user habits of young people and identify "entry points" for interventions that can help shape a more sustainable ICT use among this particular group.

Young people therefore were the target group for the EU Intelligent Energy Europe (IEE) project *Peer-to-peer Education for Youths on Smart Use of Information and Communication Technologies* (in short: useITsmartly). More specifically, the focus was placed on young people aged 16–20 years in five European countries (Germany, the Netherlands, Austria, Norway, and Denmark). The aim of useITsmartly was to reduce the energy consumption related to ICT by developing innovative solutions to reach young people and facilitate their capacity to use ICT "smartly", i.e. less energy consuming.

This report forms the first section of the project's results and presents the main findings of the introductory mapping of energy consumption and user patterns related to young people's use of ICT and covers the following points:

- Identification of those ICT user practices that are particularly important to address in order to save energy and map current technological and social trends, enablers and barriers for reducing energy consumption resulting from the use of ICT
- Detection of young people's knowledge, attitudes and practices of ICT use in order to customise and target later activities and campaigns aimed at capacity building
- Main policy recommendations.

2. How much does the energy consumption of ICT matter?

There are different kinds of energy consumption related to the use of ICT. The most "visible" is the electricity consumed during the use of ICT devices (e.g. when recharging the batteries of mobile phones). In addition to this direct electricity consumption, energy is also consumed in relation to the other life-cycle phases of ICTs, i.e. the production and disposal of devices. This is termed the embodied energy consumption.

Direct electricity consumption and embodied energy consumption together represent what has been termed the 1st order effects of ICTs (Hilty 2008). These are the kinds of energy consumption on the product level. However, the use of ICT further has "hidden" and secondary effects. These 2nd order effects represent the "indirect environmental effects of ICT due to its power to change processes (such as production, transport or consumption processes), resulting in a decrease or increase of the environmental impacts of these processes" (ibid.: 16). It is also important to emphasise that ICT in principle possesses a potential for dematerialisation, and therefore can play a role as enabling energy saving within other consumption areas (positive 2nd order effects). Examples can be movie streaming replacing physical DVDs or e-books and online news reading replacing traditional paper media. Since 2nd order effects can be both negative and positive in terms of energy consumption, especially the internet-related energy consumption, i.e. the energy consumption related to transmitting data via the internet and data storage and processing at data centres, plays a significant role for the total 2nd order effects.

Finally, 3rd order effects are the energy impacts of economy-wide changes, i.e. changes in social structures, consumption or production patterns etc. These are medium and long-term systemic effects of the use of ICT. As 3rd order effects are highly complex and difficult to estimate, we have not included them in this study.

On the basis of a review of current literature on ICT-related energy consumption, we have identified the following practices or habits as particularly energy intensive and important to focus on if the goal is to reduce energy consumption through changed ICT user practices. Our focus has been on 1st and 2nd order effects.

- Desktop computers involve high power consumption during use/operation phases.
- The habit of not turning off devices and leaving them in standby/sleep mode contributes to significant energy consumption.
- Use of internet services involving high volumes of data traffic results in high energy consumption. This is mainly streaming/downloading of movies and video clips or similar data-intensive activities like online gaming.
- Using mobile broadband access connections instead of Wi-Fi on mobile devices results in relatively high power consumption for data transmission (especially if used for data-intensive activities like movie streaming).
- Watching television is a particularly energy-intensive ICT activity because typical television sets have a high power consumption compared to smaller ICT devices.
- Frequent replacement and purchasing of ICT devices results in increased energy (and resource/material) consumption for manufacturing as well as for handling electronic waste.

Further Information

The energy intensity of streaming

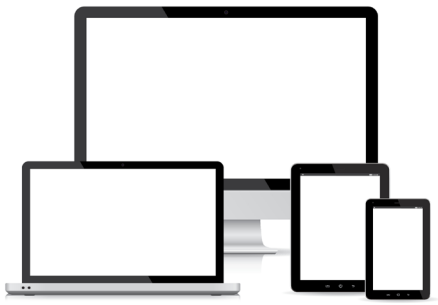
Coroama et al. (2013) estimate the direct energy demand of internet data transmission to about 0.2 kWh/GB (this includes only the transmission infrastructure, including electricity consumption for router on sender and receiver side). On the basis of this, the estimated energy intensities of different types of video and music streaming are:
Video streaming in high quality: 449 W
Video streaming in medium quality: 269 W
Video streaming on YouTube: 54 W
Music streaming: 9 W
For comparison, a 42 inches LED television set has a power consumption of about 55-65 W.

Standby energy consumption

Much focus has been on the standby power consumption of ICTs. The EU Ecodesign Directive sets limits to the level of power consumption of a number of household and office devices, which helps to reduce the standby power consumption. However, an increasing number of devices partly outbalance the achievements of the EU directive. On the basis of the national literature survey, we estimate that standby power consumption accounts for about 10 % of the residential electricity consumption in the countries participating in this study.

"Small" versus "large" devices

When it comes to 1st order effects, a general "rule of thumb" has it that for small portable devices (like smart phones, tablets and laptops), the major part of the energy consumption relates to manufacturing and disposal, whereas the use (operation) phase represents the main contribution to the energy consumption for large devices (e.g. desktops and television sets).



3. How do young people use ICT?

In addition to the literature review each project country carried out interviews in focus groups with young people between 16–20 years, which was complemented by a questionnaire collecting data on use of ICT. This chapter gives a summary of the results.

Devices

On average, the participants in the focus groups reported that they used about five ICT devices on a regular basis. The most frequently used devices by far are smartphones and laptops (in both cases used regularly by about 80–90 % of the participants), followed by (shared) television sets at home (about 60 %), desktop computers at school (about 50 %) and at home (about 40 %). Other devices regularly used by 30–40 % of the participants were: Television in own room, game console, tablet and mp3 player. Overall, three types of ICT devices stand out as the most widely used: Mobile/smartphones, laptops and television sets.

Participants attending general secondary (grammar) school or higher technical education used laptops most frequently due to the close integration of this device in both teaching and homework, whereas laptops in general were used less extensively by participants attending vocational schools or similar. It indicates that the type of education has an important influence on the use of devices. This was also confirmed with respect to how the participants typically access internet services like Facebook etc.; participants who typically used laptops for education-related purposes more often used computers to access the internet, whereas students attending vocational schools or similar to a higher extent accessed the internet via their smartphone.

The focus groups indicated that it is a widespread practice among young people to keep old phones as "spare phones" instead of handing them in for recycling and thus, old phones are not made available for the use of others nor can their materials be reused. The focus groups also included several examples of ICT devices that the participants had acquired but rarely used (e.g. 3D-TV, game consoles and – in particular – tablets). Embodied resource consumption could significantly be reduced, if these kinds of purchases could be avoided.

User practices

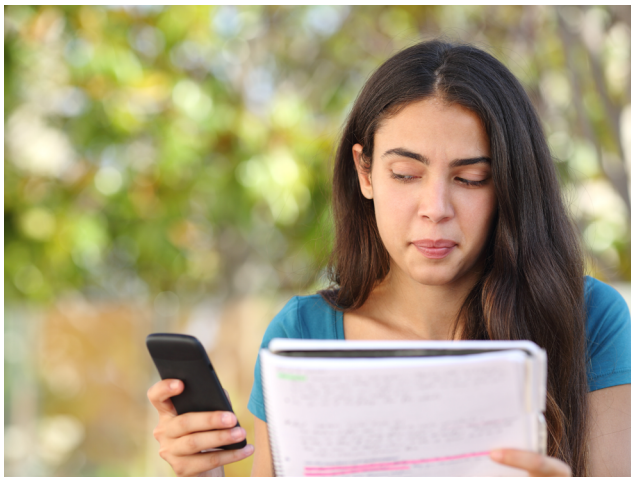
The great majority of the focus group participants explained that they used ICT intensively in their everyday life. In the survey the participants were asked how frequent they used ICT for a number of energy-intensive activities like video streaming or playing games. Their responses show that uploading/watching photos or videos on social media was widespread on both laptops/desktops and smartphones, while streaming video/television/music was widespread on laptops/desktops (reported by about 50 % of the participants to take place daily). Other common energy-intensive practices were gaming (on- and offline) on laptop/desktop or mobile/smartphone, which about one third did at least weekly, while about a fifth report to play games on game consoles at least weekly.

Gender differences

While the type of education seems to play a role for the choice of device and use of ICT, the focus group survey only revealed few gendered differences, mostly in relation to the use of computers (laptops/desktops) and game consoles. Thus, male participants streamed music/video and played games on their computer much more frequently than the female participants. The gender difference is particularly strong for playing games on computers or gaming consoles, very few female participants reported playing on games on these devices often. With regard to other ICT devices, the survey indicated that male participants more often watched television on their own television set than on a shared television. Even though the differences in this study are in general limited, they suggest that young men tend to have more energy-intensive ICT habits (more devices used more often for more energy-intensive activities) compared to young women.

ICT use and effects

Facebook and WhatsApp were the most widespread social networking media, although the focus groups showed important differences between the countries. Thus, WhatsApp seems particular widespread in Austria, the Netherlands and to some degree Germany, while Facebook was the primary social media used in Norway and Denmark. Other social media like Instagram, Twitter and Snapchat seemed to have a relatively limited use across all countries. Many participants describe the flow of messages via social media (in particular WhatsApp and Facebook) as a "source of distraction" in their daily life. Often, messages divert their attention from other things that they feel they should focus on instead (like studying). Not all were able to cope with this in a relaxed way and some have developed strategies to avoid distractions such as blocking messages until they were done with homework.



The theme of "always being online and accessible" cuts aross most of the focus groups. Messages frequently "pop up" on the computer while they are doing other things or via applications on the ubiquitous and "always-at-hand" smartphone. At the same time, many focus groups talked about the "need" to be online and connected all the time as a kind of "social pressure". "You need Facebook if you want to be part of society", as one Norwegian participant explained.

ICT devices – and in particular smartphones – are also often used for entertainment and to "fill in" time between other activities (e.g. while waiting for the bus). As mentioned before, music and video streaming are very widespread (often due to the convenience of being able to watch a movie or serial when you like it). Also here, many focus groups voiced a more critical concern about possible negative effects of always being online. The frequent use of computers and smartphones for entertainment can easily divert attention from other activities.

The term "being addicted" to ICT came up in several focus groups, and some participants also pointed at possible "anti-social" consequences of ICT. Computers, and particularly smartphones, represent an always-available temptation for diversion, entertainment and connectedness with friends.

A feeling of ambivalence with regard to the use of ICT seems widespread among young people. On one hand, they think ICT offers many positive options for social interaction, entertainment and convenience, but at the same time they also associate their own use of ICT with aspects of wasting time, procrastination, distraction and alienation of social relations.

4. Do young people see a link between ICT use and climate change?

Awareness

Overall, the focus groups showed limited awareness and interest in energy and climate change issues related to ICT. The participants often found it difficult to elaborate on the links between their personal use of ICT and energy consumption or climate change, and most had never thought about this link before.

Most of the participants had heard about climate change, but it did not concern them. They seemed reluctant of the idea of changing their daily habits in order to save energy. Some had also heard about general environmental problems related to ICT through school or media (e.g. the extraction of noble metals, conflict minerals and problems with electronic waste export to developing countries).

An important reason for the limited awareness of the link between ICT and energy and climate change problems is the "invisible" nature of the link between purchase and use of ICT and energy and anthropogenic climate change. This applies in particular to the production and disposal of ICT devices as well as derived energy implications related to the use of the internet.

This being said, the participants found it easier to see the link between the use of ICT and the direct electricity consumption – especially in relation to their use of portable phones and the experience of having to recharge these often. In some focus groups, the participants even developed rather elaborate understandings of how the direct electricity consumption depended on what the devices were used for. The experience of battery life-time and devices becoming warm often seems to provide reliable and valid insights. This could form an entry point for raising young people's awareness of ICT and energy consumption and a point of departure for further discussions about ICT and energy. However, the practical experience of ICT and energy consumption may also be misleading as these do not include the "hidden" energy consumption and are mainly related to portable devices.

Sources of knowledge about ICT and the environment mentioned in the focus groups were school and – to a lesser extent – popular TV science shows, websites or parents.

Further Information

Understandings of direct consumption

A few examples illustrate how many focus groups were able to develop a rather comprehensive understanding of the link between use of ICT and direct electricity consumption:

„With mobile internet on your phone, you need to charge it much more often [...]. I had this mobile without internet [before] and then I could use it for a week. Now I can use it only for one day [before recharging], you use a lot more power."

(Dutch Focus Group)

„Also, if you are streaming Netflix, for instance, on your iPad, when you can indeed feel that – if you are running HD – that it gets hot on the back, because it works. And heat is also energy, so it must also use some energy."

(Danish Focus Group)

Motivation for changing practices

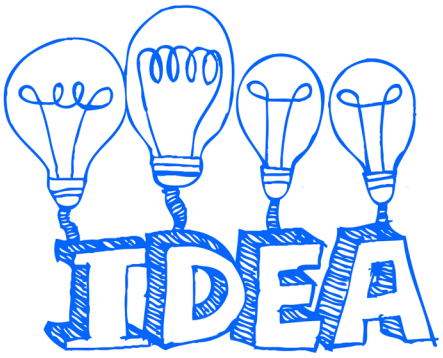
The question of "who's responsible" for solving the climate change problems related to ICT came up in most focus groups. In general, the young people rather seemed to allocate the responsibility to other actors than themselves. Several pointed out the industry's responsibility for designing more efficient and environment-friendly products, or the responsibility of energy providers to generate "green energy", and politicians to decide on "green" regulations and laws.

The understanding that ICT has a limited impact on climate change or is being over-shadowed by other consumption areas with much higher energy consumption (e.g. transport) also seems to influence the participants' motivation to change own habits and save energy in relation to ICT. Many did not feel personally responsible for the environmental problems related to ICT.

Overall, the trust in technological development as the main road to reduce the impact of ICT-use on climate change seemed widespread among the participants. They felt confidence in technological solutions as a way to save energy and reduce greenhouse gas emissions from ICT-use. This also forms part of the reason why only very few participants felt a direct, personal responsibility for saving energy in relation to their own use of ICT.

Thus, the willingness and motivation of the focus group participants to change their use of ICT in order to save energy was limited. There was consensus across the groups that only if energy-saving habits did not involve too much effort and compromise to the convenience of use, they might consider changing their habits.

Even though most participants were sceptical towards the idea of changing habits, several also came up with specific ideas on how one could save energy (see blue text to the right). A few also expressed a positive attitude towards changing their own practices. The financial aspect (saving money) was mentioned by many participants as a possible motivation, but seemed irrelevant in their present situation as most still lived at home with their parents (who pay the electricity bill).



Further Information

Ideas on how to save energy

Despite the general reluctance to changing personal practices, the focus groups came up with a number of ideas on how to save energy in relation to ICT:

- Promote repair instead of replacing – e.g. by making repairs less expensive
- Think about whether new ICT devices really are necessary – e.g. by not replacing old phones just because it would be "nice" to have the newest model
- Promote correct disposal of ICT
- Avoid standby power consumption – e.g. power down computers between uses
- Use less ICT (e.g. Facebook, video streaming etc.), promote a more "reflexive" use of ICT
- Use fewer devices by doing things together (e.g. watching a movie together with friends or family) and avoid multi-tasking (e.g. not having the television running while using the laptop)
- More information about the link between ICT and climate change – and how to save energy
- Technical improvements – e.g. make products last longer
- Using ICT to save energy in other consumption areas – e.g. use ICT to inform about energy consumption related to, for instance, transport.

Many also pointed out problems of "lock-in" and that changing one's use of ICT to save energy would be like swimming against the tide. The use of ICT has become an integral part of almost all everyday practices and social relations, which makes it difficult to change one's habits if everybody else continues. One participant compared it to being on a slimming diet alone, while all other members of the household would go on eating as usual. This suggests a need to think about changing practices as a collective exercise rather than (only) targeting the individual.

5. Conclusions and policy recommendations

This section gives our main observations and recommendations for policy-makers and designers of initiatives to promote energy-saving in relation to young people's use of ICT dervied from the literature study, the information and data collected in the focus groups.

1 Include the "hidden" energy consumption

Traditionally, initiatives to promote energy saving in relation to ICT have mainly focused on the direct electricity consumption from the use of devices. However, the literature review of this study shows that the "hidden" energy consumption is significant too, and might be even more important in the future. For small devices like laptops, smartphones and tablets, the embodied energy consumption related to production and disposal is comparable to or even higher than the direct electricity consumption from the use phase. In addition, the internet-related energy consumption from data transmission and data storage and processing at data centres is also growing rapidly and has become an important contribution to the overall energy consumption of ICT. Internet services that involve high data traffic such as video streaming and video sharing result in high energy consumption in the internet infrastructure.

From a climate change perspective, it is therefore important to also address these "hidden" energy implications of the use of ICT. This might in particular apply to young people, who are among the users that use ICT devices and internet services most extensively.

2 Focus on energy-intensive practices

ICT is used for a great variety of practices with widely different energy implications. Some uses involve very little direct or "hidden" energy consumption such as text messaging, whereas others are very energy-intensive such as video streaming in high definition. Initiatives to promote energy saving in relation to ICT should recognise this complexity and should primarily address ICT user practices that are energy-intensive.

Energy-intensive usage of ICT typically includes one or more of the following characteristics:

1. involving a high level of data processing (direct electricity consumption),
2. involving high amounts of internet data traffic (internet-related energy consumption),
3. involving the use of several devices at the same time through multi-tasking (direct electricity consumption).

In addition – and taking the embodied energy consumption into account – also practices that increase the number of devices as well as the wrong disposal of ICT should be addressed.

On basis of the focus groups and the literature reviewed, the following practices have been identified as particular important to address in campaigns aiming at reducing the energy consumption of young people's use of ICT.

Standby

The electricity consumption related to computers and electronics that are not switched off between uses is still significant.

Video streaming

Currently, increased streaming of audio-visual content via the internet seems to be one of the most important drivers for increasing energy consumption for ICT.

Sharing photos/video clips

Even though the energy consumption for sharing photos or short video clips is not in the same magnitude of order as video streaming, this might also involve significant energy consumption – particularly if it takes place via mobile broadband (3G/4G).

Using several devices at the same time

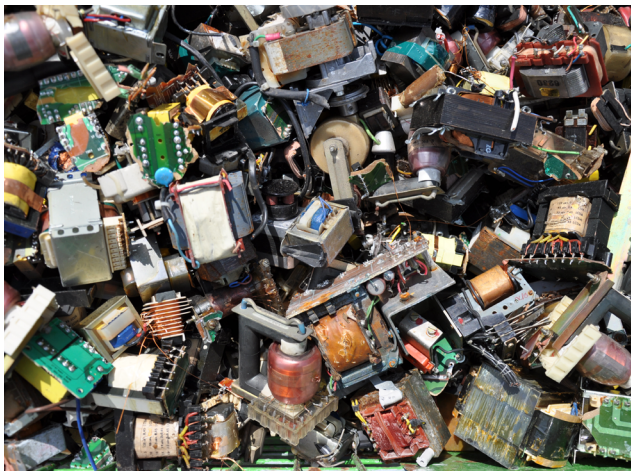
Having more devices turned on at the same time (e.g. watching television while doing home-work on laptop and communicating with friends via smart phone) contributes to high energy consumption. A particular focus should be on the use of television sets as a "backcloth" for other activities, as television sets are among the ICT devices with the highest direct electricity consumption.

Devices rarely used
Young people often acquire ICT devices that they rarely use (e.g. tablets and game consoles). The embodied energy consumption could be reduced if the acquisition of rarely used devices was avoided.

Keeping old phones as spare phones
Young people often keep their old phones as spare phones, but as these are not often technically obsolete, they could be reused by others and in this way reduce the overall replacement rate.

Frequent replacement of ICT devices
The frequent replacement of ICT devices contributes to a high energy (and material) consumption for manufacturing and problems with electronic waste. It is important to promote the use of devices for a longer time before replacement.

Limited awareness of correct disposal
In general, young people are not aware of the importance of correct disposal of ICT devices, which is problematic in a general environmental perspective.



3 An integral part of young people's life

ICT has become an integral element in young people's everyday life. Thus, ICT is involved in most practices that young people are engaged in (entertainment, social interaction with friends and schoolmates, school-related work, etc.). The extensive integration of ICTs in the everyday practices and the habit of always being online and accessible result in an extensive use of ICTs (often through multi-tasking) and a generally resource-intensive everyday life of young people.

This also represents one of the most important "barriers" for turning young people's ICT usage in a less resource-intensive direction. The collective nature of ICT usage challenges the idea of targeting young people as individuals and the idea of young people's use of ICT as being a result of rational choices that might be changed by providing them with more information. Instead, interventions and campaigns should to a higher extent be designed to facilitate (also) collective action among young people as well as addressing other elements that shape young people's use of ICT (see later recommendations).

4 Young people find it difficult to see the link between ICT and energy consumption

The study shows young people's limited awareness of climate change's relation to their use of ICT. They further believe that the environmental consequences of their use of ICT are limited.

Lacking awareness of the energy implications of ICT is one of the reasons why young people in general seem unwilling and sceptical towards the idea of changing their practices in order to save energy.

Further they tend to believe that the potential energy savings that they individually could reach are insignificant, like a "drop in the ocean".

This represents another major challenge in relation to developing interventions and campaigns addressing young people's use of ICT. It is therefore important to design approaches that take into account that young people in general find it difficult to see the relevance of addressing their use of ICT as a subject for energy saving. Thus, interventions should convey the connection between ICT and climate change in an accessible and illustrative way.

However, despite young people's general ignorance of the energy and climate change implications of ICT, the study shows that they actually possess an often rather detailed (but implicit) knowledge about the direct electricity consumption of portable devices. This is mainly due to practical and sometimes very tangible experiences with how the life time of battery charges and the heat production of mobile devices depend on the specific use of these devices. This "practical knowledge" might be utilised in initiatives to promote energy saving as a way to make the topic of ICT and energy consumption meaningful to young people and spur reflections about this (see also later recommendation about "entry points").

5 „Young people" are a heterogeneous group

When designing policies and campaigns for young people's use of ICT, it is important to have in mind that this is a heterogeneous group. Despite the general patterns with regard to the use of ICT found in this study (e.g. the extensive integration of ICT in everyday practices), the focus groups also showed differences that can be related to gender, educational status, personal interests etc. Especially the type of education seems to play

an important role for how young people use ICT (which devices used for which purposes), but also some energy-intensive ICT usages seem to be somewhat gendered (for instance game playing which seems to be particularly prevalent among young males).

Policies and campaigns targeting young people should consider the heterogeneity of young people either through a flexible and inclusive design that makes sense to a broad range of young people or through a set of incentives tailored to specific groups of young people.

6 Address energy saving as a collective task

Another important reason for young people's apparent lack of willingness to change their everyday practices in order to save energy is closely related to the integration of ICT across almost all everyday practices. The "normalisation" of use of ICT in everyday life implies that changing the use of ICT (e.g. to save energy) creates the experience of swimming against the tide – i.e. an experience of "fighting" against what is perceived as "normal" and what everybody does. If everyone else continues their usual practices, it is difficult to maintain new, energy-saving habits and routines.

This suggests that policies and campaigns aimed at promoting energy-saving ICT usage should address this as a collective task rather than a responsibility to be raised by the individual young person. Furthermore, this approach would be in line with studies showing that young people are strongly influenced by their peers in relation to topics like environment and energy saving. If young people's interest in saving energy in relation to ICT within a community could be elicited, they could motivate and support each other to keep a focus on this and develop and maintain new energy-saving routines.

That policies and campaigns should address energy saving as a collective rather than an individual challenge is in line with the idea behind peer-to-peer education, which was a key method in this project.

7 Look for possible entry points

Young people's limited awareness of the connection between ICT and energy and their moderate willingness to consider changing their daily use of ICT seem to be major challenges for designing effective policies and campaigns. Therefore, it is important to identify possible "entry points" for interventions that can help shape a more sustainable ICT use among this group. By "entry points", we think of the potential or enablers for making young people interested in this topic and/or supporting them in attempts at adopting more energy-efficient uses of ICT.

On the basis of the reviewed literature and the focus groups, we have identified the following as possible entry points for promoting less energy-intensive use of ICT among young people.

Addressing young people's practical knowledge about ICT and energy use

As mentioned previously, young people often have a practical knowledge about how the direct electricity consumption of particularly portable ICT devices depends on how they use them. This existing knowledge could be utilised as a foundation for making the link between ICT and energy consumption comprehensible to young people.

Addressing young people's interest in extending the life time of battery charges

There seems to be a widespread interest among young people to learn methods for extending the life time of battery charges of portable devices such as tablets, laptops and (in particular) smartphones. Many have also learned different "tricks" on how to extend the life time of the battery charge (e.g. turn off mobile broadband). Addressing this interest could be a way of addressing energy-saving habits more generally.

Influence through parents and peers

The social network – in particular parents and peers – seems to have an important influence on motivating young people to adopt energy-saving habits. This makes it important to include the social network of young people in initiatives aimed at promoting energy-saving use of ICT. This is also in line with the previous recommendation of addressing energy saving as a collective task.

Addressing negative implications of always being online and accessible

Even though the majority of young people seem to enjoy always being online and accessible, many also describe downsides like distraction, waste of time, mediated interaction with others as being "unauthentic" and even concerns about negative health effects by intensive use of ICT. Addressing this kind of negative implications of ICT usage could be a way of opening a discussion about a more

"reflexive" use of ICT, which could – among other things – address energy-intensive practices like the simultaneous use of several devices (multi-tasking) or promote a more deliberate use of online gaming and video streaming.

Addressing the problem of rarely used devices
It seems as if many young people have experience of owning devices that they only rarely use. Addressing this experience explicitly might help develop a more reflexive approach to the acquisition of new devices, which could be a way of reducing the total number of ICT devices.

8 It is not only about the individual consumer

Young people's use of ICT is a result of the interaction of many different, heterogeneous elements. Particularly the development and design of new ICT products and services seems to play an important role in shaping young people's use of ICT. Therefore, in order to lessen the inconvenience related to changing practices, interventions and campaigns should also address the actors involved in designing and developing products and services. Ideally, environmental concerns should be integrated in the design of new products and services right from the beginning and in this way support a more energy-efficient use of ICT.

6. Next steps and further information

The useITsmartly team has made the attempt to transfer and integrate the information gathered by the focus groups and literature review to the next steps of the project. The toolbox is the result of creativity workshops held in the project countries. It contains all ideas the young people came up with in those workshops. The creative brainstormings on how to effectively save energy by changing habits in ICT use or by saving energy via ICT were focusing on the energy-intensive practices that have been identified in this first part of the project (see selection of energy intensive practices on pp. 6–7 of this report).

Further, all the expertise on young people's use of ICT, attitude towards energy saving an climate change have been integrated into the green-IT-peer-trainings, which formed the third part of the project.

All materials can be downloaded from the project website in the download-section of www.useitsmartly.com.

Focus groups and mapping exercise
For a detailed presentation of the organisation, methods and empirical results and analysis see:

Christensen, Toke Haunstrup (2014). Identify relevant areas of energy-efficient IT use, user practices and possibilities and barriers for change. Technical Report.

Setup of creativity workshops
For a description of the setup, outcomes, and evaluation of the creativity workshops see:

Renkens, José and Rommes, Els (2014). Exploration of innovative solutions together with youths. Technical Report and Reports of all proposed solutions of the adolescent workshops.

Toolbox
All ideas collected in the creativity workshops were rated, discussed and assembled through experts and the project consortium. The result is an interactive toolbox with tools that e.g. environmental organizations, youth, schools, companies or policy makers can use to change IT practices of youth. The toolbox is meant to be a practical instrument to inspire and encourage youth and other actors to take action towards using IT more smartly. It is online accessible under:

www.useitsmartly.com/toolbox/

Capacity building for smart and green IT use
Two didactical concepts form the basis of the green-IT-peer-trainings:

Berger, Thomas; Thaler, Anita; Wicher, Magdalena (2015). Collection of didactical concepts for application of the vehicle apporach for educational settings targeted at smart and green IT use.

Auer, Ulrike and Pilz, Cosima (2015). Didactical concepts for IT peer trainings.

Guidelines and materials for multipliers
This brochure is an instruction to organizing green-IT-peer-trainings on your own, it contains the most successful training materials used in the peer-trainings and is enriched by the consortium's lessons learned:

Pilz, Cosima and Compes, Natascha and the useITsmartly Consortium (ed.) (2016). Guidelines and Material for Multipliers.

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Gram-Hanssen, K. (2005): Teenage consumption of information and communication technology. Proceedings of the 2005 European Council for an Energy Efficient Economy.

Hilty, L.M. (2008): Information Technology and Sustainability: Essays on the Relationship between ICT and Sustainable Development. Norderstedt: Books on Demand GmbH.

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